Advantages of Walking and Cycling:

- **Economical**: Affordable by everyone, requiring minimal costs for individuals and governments
- **Good for business**: Generate retail sales and profits from tourism
- **Environmentally friendly**: Virtually no pollution
- **Energy-efficient**: Use up calories we need to burn off from eating too much
- **Healthy**: Many studies report on physical, social, mental health benefits
- **Fun**: Getting out into the fresh air with family and friends
WALKING AND CYCLING ARE HEALTHY!

• GREAT source of physical activity:
  • Both for daily travel and for recreation
  • Cheaper, easier, and more dependable than formal exercise routines
  • Can be integrated into daily lifestyle to achieve practical travel needs

2007 Age-Adjusted Estimates of the Percentage of Adults Who Are Physically Inactive

Source: US Centers for Disease Control and Prevention, 2012
Obesity, 2007

Percent of Commuters Who Drive

Price and Godwin, Planetizen 2012
Obesity Falls with Increased Walking and Cycling

Obesity among US children has quadrupled as rates of walking and cycling to school have plummeted.

Cycling Share of Daily Trips in Europe, North America, and Australia, 1999-2008


Bicycle Share of Work Commuters in the USA (2007) and Canada (2006)

Bike Share of Trips in Selected Cities in the Netherlands, Denmark, and Germany (2000-2009)


Bike Share of Trips in Selected cities in UK, Canada, USA, and Australia (2000-2009)

Trend in Bike Commuting in Large North American, Australian, and European Cities, 1990-2009

Spatial Variation in Bicycle Share of Work Commuters in New York City Area, 2005-2009

Spatial Variation in Bicycle Share of Work Commuters in Washington, D.C. Area, 2005-2009

Lots of Potential for Increased Cycling:

Many daily trips in American and Canadian urban areas are short enough to bike!

- ~27% of all trips in the U.S. were a mile or shorter in 2009
- ~41% of all trips were shorter than two miles
Europeans cycle for many trip purposes

Share of weekday bicycle trips by trip purpose in the Washington, D.C. region compared to U.S. national averages for urbanized areas, 2008/2009

Women’s Share of Bike Trips in Europe and North America

Bicycle share of trips and percentage of female cyclists in large cities


Cycling Safety Concerns by Gender in Six Small U.S. Cities

55% of all bike trips in Denmark are by women

Source: Susan Handy

Bike Share of Trips by Age Group

Cycling for all ages

Multi-generational cycling in Amsterdam
Make Walking and Cycling Safe for Everyone!

- Especially important for the young, the old, for anyone with disabilities, for the timid or risk-averse
- Women more sensitive to safety than men
- Safety of walking and cycling in the Netherlands, Denmark, and Germany helps explain high levels of walking and cycling there

Cyclist Fatality and Injury Rates, 2007-2010

SAFETY IN NUMBERS

• As levels of cycling increase, injury and fatality rates per trip and per km traveled fall dramatically

• Thus, if we can increase cycling, it will almost inevitably be safer
Safety in Numbers: Cyclist fatality rate falls as cycling levels increase.

Decreasing Crash Rate in Portland

Public Policies *Crucial* to Walking and Cycling

- Pro-car policies in European cities in 1950s and 1960s caused huge decline in walking and cycling
- Dramatic policy turn-around since 1970s to limit car use and promote cycling, walking, and public transport in Dutch, Danish, and German cities
Bridge in Freiburg BEFORE and AFTER reforms

Typical residential street in Freiburg BEFORE traffic calming reforms

Typical residential street in Freiburg AFTER traffic calming reforms
Cathedral Square in Freiburg BEFORE transport and urban planning reforms

Cathedral Square in Freiburg AFTER transport and urban planning reforms

1953

Lörrach, Turmstrasse 1953

Source: Archives, City of Lörrach
How to Encourage More Cycling and Walking while Improving Safety

• Better cycling and walking facilities
• Integration of walk/bike with public transport
• Traffic calming of residential neighborhoods
• Mixed-use zoning and improved urban design
• Restrictions on motor vehicle use
• Traffic education and Safe Routes to School
• Traffic regulations and enforcement

National Level Policies

• Goals of increasing cycling levels and safety
• Improved data collection and benchmarking
• Bike infrastructure along federal/national roadways
• Cyclist and motorist training
• Traffic laws, signage, roadway and bikeway design guidelines
• Matching funds for approved state and local projects
• Funding for ‘showcase’ projects

State and local governments ultimately responsible for implementing specific cycling infrastructure and programs.
Most European cities have extensive car-free districts ideal for walking and cycling.

Car-free Broadway in New York City

Times Square
Herald Square
Trend in Bike Paths and Lanes per 100,000 Population in Nine Large North American Cities, 2000-2010

Separate Bikeways in Germany

Sources: City of Freiburg & Pucher
Bike paths in Dutch cities make it safe and comfortable for all to bike: including women, children, and seniors

Greenway in Minneapolis

Stone Arch Bridge in Minneapolis
Santa Barbara coastal path: Safe and attractive both for cyclists and pedestrians

Conversion of two car lanes to bike path and wider sidewalk

One-way cycle track in The Hague

Source: Peter Furth
Almost 100km of 2-way cycle tracks in Montreal

Separation from traffic via bollards and parked cars

Separation from traffic via concrete barriers

• 250 mi of new bike lanes and paths since 2005
• Doubling in bike trips
• Halving of cyclist fatalities from 28 to 14

Traffic-Protected Cycle Track on 9th Avenue, NYC
Bike Lanes in New York

Cycle Track on Pennsylvania Avenue in Washington, DC

Connects the White House with U.S. Capitol

Source: Buehler
Dutch bicycle facility selection matrix

Supply of bike lanes and paved off-street paths and trails, 2011

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<th>Jurisdiction</th>
<th>On-Street Lanes (miles)</th>
<th>Paved Off-Street Trails (miles)</th>
<th>On-Street Lanes and Off-Street Trails (miles)</th>
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<td>90</td>
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</tr>
</tbody>
</table>
Supply of bike lanes and paths and cycling commute levels in Washington, DC, early 2000-2003 (left) and 2007-2009 (right).

Crucial to provide river crossings for cyclists

Bike bridge over Yarra River in Melbourne, Australia

Bike bridge over Ems River in Muenster, Germany
About 20,000 daily bike trips over Portland bridges

Provision of cycle track at this key underpass in Montreal
Special traffic signals and signs give priority to cyclists.

Intersection in Copenhagen, with Separate Crossings for Pedestrians and Cyclists.
Four-way all-green signal for cyclists in Portland

Red bike lanes for intersection crossings, connected with red brick sidepaths on both sides of every road

Source: City of Muenster, Germany
Advanced stop line for cyclists in Muenster

Advanced stop line for cyclists in Berlin

Advanced stop line and bike box in Portland
Traffic Calming of Residential Neighborhoods

• Speed limited by law to 30km per hour (19mph) or less

• Physical measures that force cars to slow down:
  • Road narrowing, zigzag routing, chicanes
  • Raised intersections and crosswalks
  • Traffic circles
  • Speed humps and bumps
  • Mid-block closures and artificial dead-ends
  • Bulb-outs at intersections and crosswalks, with sidewalk widening
Why Traffic Calming Saves Lives

Figure 1.1 Probability of fatal injury for a pedestrian colliding with a vehicle


Speed kills!

Convenient bike cut-thru for cyclists

Source: Photo by Peter Berkeley
Traffic Calming in Québec City and Montreal

Cheap, easy, and very effective traffic diverters

Traffic Calming in Freiburg, Germany

Cheap, easy, fast, and effective improvement in cycling and walking safety
Typical traffic calming in new German suburbs

7 km/hr speed limit

Bike Boulevards in Portland
(in 15 US cities in 2012)
1,100 km of bicycling facilities in Berlin plus 3,800 km of traffic calmed streets = 10% bike share of all trips

**Bike Parking Spaces per 100,000 Residents, 2008**

Conversion of Car Parking to Bike Parking

27 bike corrals in San Francisco
95 bike corrals in Portland

Bike Parking and Showers At Work
Increase Likelihood to Commute by Bike

Note: Relative to 1. Above 1=more likely. Below 1=less likely.

BIKE TRANSIT INTEGRATION

Over 50,000 buses in the USA now come equipped with bike racks

Photo: Metro Transit
Bike on LRT in NJ and Minneapolis

Bikes on Caltrain in San Francisco
Bi-directional cycle track and bike sharing near metro station in Montréal

BIXI bike docking station

Source: Vélo Québec

Bike Station next to main train station in Muenster, Germany

Capacity: 3,500 bikes

Photo: Peter Berkeley
Bike Wash at Muenster Bike Station

Bike Station next to Union Station in Washington, D.C.
Nice Ride in Minneapolis
Hubway Bikeshare in Cambridge, Boston, Somerville, and Brookline

Over 20 bike sharing systems in North America

Who are the ‘bike-sharers’?
Example Washington DC (1)

Source: Buehler et al. 2012. Are Bikeshare Users Different from Regular Cyclists? A First Look at Short-Term Users, Annual Members, and Area Cyclists in the Washington, DC Region
Who are the ‘bike sharers’?
Example Washington DC (2)

Source: Buehler et al. 2012. Are Bikeshare Users Different from Regular Cyclists? A First Look at Short-Term Users, Annual Members, and Area Cyclists in the Washington, DC Region

Bike Sharing Trips in Washington DC

Source: Buehler et al. 2012. Are Bikeshare Users Different from Regular Cyclists? A First Look at Short-Term Users, Annual Members, and Area Cyclists in the Washington, DC Region
Traffic Education

• Improved motorist training, with *much* more emphasis on how to avoid endangering pedestrians and cyclists

• Compulsory traffic safety lessons for all school children by the age of 10, with testing by traffic police on actual traffic test courses, to ensure safe and defensive walking and cycling by an early age (as in the Netherlands and Germany)
Most German and Dutch children take cycling lessons by the 3rd or 4th grade and must pass a police-administered cycling safety test!

Bike path leads directly to school in NL
Bike Training for Children in New Jersey

Cycling training course for adults
Summer Streets in New York City attracts 200,000 participants on Saturdays in August

Guided Bicycle Tours for Seniors
CONCLUSIONS

• Cycling is one of the most sustainable means of getting around our cities
• Broad range of environmental, social, economic, and health benefits
• Many ways to increase cycling while making it safer
• Lots of daily trips in American cities are short enough to cover by cycling
• Many cities in Europe and some in North America show what is possible and offer superb examples to follow

New book with MIT Press
http://citycyclingbook.wordpress.com

About the authors:
http://policy.rutgers.edu/faculty/pucher/
http://ralphbu.wordpress.com
Measures to Increase Cycling

1. Provide a comprehensive package of integrated measures
2. Build a network of integrated bikeways with intersections that facilitate cycling
3. Provide good bike parking at key destinations and public transport stations
4. Implement bike sharing programs
5. Provide convenient information and promotional events
6. Introduce individualized marketing to target specific groups
7. Improve cyclist education and expand bike to school programs
8. Improve motorist training, licensing, and traffic enforcement
9. Restrict car use through traffic calming, car-free zones, and less parking
10. Design communities to be compact, mixed-use, and bikeable

Implementation Strategies

1. Publicize both individual and societal benefits
2. Ensure citizen participation at all stages of planning and implementation
3. Develop long-range bike plans and regularly update them
4. Implement controversial policies in stages
5. Combine incentives for cycling and disincentives for car use
6. Build alliances with politicians, cycling organizations, and other bike friendly groups
7. Coordinate bike advocacy and planning through national organizations